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ABSTRACT

The United States Training and Employment Service General Aptitude Test Battery (GATB), first published in 1947, has been included in a continuing program of research to validate the tests against success in many different occupations. The GATB consists of 12 tests which measure nine aptitudes: General Learning Ability; Verbal Aptitude; Numerical Aptitude; Spatial Aptitude; Form Perception; Clerical Perception; Motor Coordination; Finger Dexterity; and Manual Dexterity. The aptitude scores are standard scores with 100 as the average for the general working population, and a standard deviation of 20. Occupational norms are established in terms of minimum qualifying scores for each of the significant aptitude measures which, when combined, predict job performance. Cutting scores are set only for those aptitudes which aid in predicting the performance of the job duties of the experimental sample. The GATB norms described are appropriate only for jobs with content similar to that shown in the job description presented in this report. A description of the validation sample is also included. (AG)

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TECHNICAL REPORT

ON

STANDARDIZATION OF THE GENERAL APTITUDE TEST BATTERY

FOR

WEIGHING STATION OPERATOR (gov. ser.) 0-95.906

B-458 or S-188

U. S. Employment Service in
Cooperation with
North Carolina State Employment Service

U. S. DEPARTMENT OF LABOR
Bureau of Employment Security
Washington 25, D. C.

January 1962

GATB #868
August 1960

WEIGHING STATION OPERATOR (gov. ser.) 0-95.906

B-458 or S-188

Summary

The General Aptitude Test Battery, B-1001, was administered to 106 male Weighing Station Operators 0-95.906 employed at 19 local sations operated by the Department of Motor Vehicles of the State of North Carolina. The final sample was composed of 98 of these employees. The criterion consisted of supervisory ratings made on a descriptive rating scale. On the basis of mean scores, correlations with the criterion, job analysis data, and their combined selective efficiency, Aptitudes G--Intelligence, V--Verbal Aptitude, N--Numerical Aptitude, and Q--Clerical Perception were selected for inclusion in the test norms.

GATB Norms for Weighing Station Operator 0-95.906 - B-458 or S-188

Table I shows, for B-1001 and B-1002, the minimum acceptable score for each aptitude included in the test norms for Weighing Station Operator 0-95.906.

TABLE I

Minimum Acceptable Scores on B-1001 and B-1002 for B-458 or S-188

B-1001			B-1002		
Aptitude	Tests	Minimum Acceptable Aptitude Score	Aptitude	Tests	Minimum Acceptable Aptitude Score
G	CB-1-H CB-1-I CB-1-J	80	G	Part 3 Part 6 Part 4	75
V	CB-1-J	75	V	Part 4	75
N	CB-1-D CB-1-I	85	N	Part 2 Part 6	80
Q	CB-1-B	75	Q	Part 1	80

Effectiveness of Norms

The data in Table V indicate that 24 of the 31 poor workers, or 77 percent of them, did not achieve the minimum scores established as cutting scores on the recommended test norms. This shows that 77 percent of the poor workers would not have been hired if the recommended test norms had been used in the selection process. Moreover, 55 of the 62 workers who made qualifying test scores, or 89 percent, were good workers.

TECHNICAL REPORT

I. Purpose

This study was conducted to determine the best combination of aptitudes and minimum scores to be used as norms on the General Aptitude Test Battery for the occupation of Weighing Station Operator 0-95.906.

II. Sample

The General Aptitude Test Battery, B-1001, was administered on July 15, 22 and 29, 1960 to 106 male Weighing Station Operators 0-95.906 employed at 19 local weighing stations operated by the Department of Motor Vehicles of the State of North Carolina. Of the original sample of 106 employees tested, 8 of the number were eliminated from the sample for the following reasons: 1 had an artificial hand; 3 were trainees who had been on the job less than one month; 2 were over 60 years of age, and 2 were at a lower educational level than the rest of the sample. Selection of personnel for these jobs was by oral interview, character references and checking of high school records for evidence of passing grades. Minimum training period required to reach proficiency is three months. All workers in the sample had at least three months of experience.

Table II shows the means, standard deviations, ranges, and Pearson product-moment correlations with the criterion for age, education, and experience.

TABLE II

Means (M), Standard Deviations (σ), Ranges, and
Pearson Product-Moment Correlations with the Criterion (r)
for Age, Education, and Experience

N = 98

	M	σ	Range	r
Age (years)	37.3	8.3	23 - 57	-.303**
Education (years)	11.9	.6	11 - 14	.238*
Experience (months)	68.8	36.3	3 - 296	.078

**Significant at the .01 level
*Significant at the .05 level

Age shows a significant negative correlation with the criterion at the .01 level. Education shows a significant positive correlation with the criterion at the .05 level. These correlations indicate a tendency for younger workers and those with more education to obtain higher criterion scores. However, neither correlation is very great in magnitude. The data in Table II indicate that the sample is suitable for test development purposes with respect to age, education and experience.

III. Job Description

Job Summary: Weighs, at a regularly established station, motor vehicles engaged in interstate and intrastate operations to determine whether or not such vehicles are being operated in accordance with laws or regulations relating to weights, cargo, and licenses.

Work Performed: Instructs motor vehicle drivers as to manner of placing vehicles on weighing scales; weighs motor vehicle, each axle separately; computes over-all weight.

Checks weight against license authorization to determine if vehicle carries proper license for weight and cargo.

Examines bills of lading and invoices to see if they correspond with actual cargo being transported on the vehicle.

Advises truck operator of type and extent of violation and penalty involved, checking table of license plate fees to determine proper amount due; collects fines for such violations or makes necessary agreements with truck operator to insure payment of assessment. Makes necessary arrangements with owners or operators of overweight or improperly licensed vehicles transporting perishable foods in order that they not be delayed.

Supervises the unloading of trucks determined to be overweight or the reloading to equalize weight on axles.

Reports to State Highway Patrol units vehicles failing to stop for weighing, or pursues such vehicles and apprehends them. Makes arrests, if necessary, and appears in court on matters protested by vehicle owners or operators.

Keeps daily tally of all trucks weighed, interstate and intrastate separately. Keeps daily record of tonnage weighed, violations, and penalties collected. Balances daily collections against tallies. Makes tabulations for weekly report.

IV. Experimental Battery

All the tests of the GATB, B-1001, were administered to the sample group.

V. Criterion

The criterion consisted of ratings based on the Descriptive Rating Scale, Form SP-21. Ratings were made by the Weighing Station Supervisors in July and August 1960. The total rating scale scores were correlated with scores on Item 1, "All-Around Ability", of the Descriptive Rating Scale. A correlation of .90 was obtained. The possible range of criterion scores was from 9 to 45. The actual range was 18 to 44 with a mean of 32.0 and a standard deviation of 5.7.

VI. Qualitative and Quantitative Analyses

A. Qualitative Analysis:

The job analysis indicated that the following aptitudes measured by the GATB appear to be important for this occupation.

Intelligence (G) - required to become readily familiar with motor vehicle laws and regulations and to determine when they are being violated in respect to cargo, weights, and licenses; and to determine course of action to be taken in case of violation, such as the collection of proper fees and fines, issuance of citations or making arrests in cases of non-cooperation of drivers.

Numerical Aptitude (N) - required in computing axle and over-road weights, in tallying and totaling number of vehicles and tonnage weighed, in preparing daily reports, and in keeping accurate account of money collected.

Clerical Aptitude (Q) - required in checking weights and bills of lading against license authorizations, in accurate reading and recording of weights, and in preparing daily records.

On the basis of the job analysis data, the following aptitudes are considered obviously unimportant for performing the duties of this job and are considered "irrelevant" aptitudes: Aptitudes S, P, A, T, F, and M.

B. Quantitative Analysis:

Table III shows the means, standard deviations, and Pearson product-moment correlations with the criterion for the aptitudes of the GATB. The means and standard deviations of the aptitudes are comparable to general working population norms with a mean of 100 and a standard deviation of 20.

TABLE III

Means (M), Standard Deviations (σ), and Pearson Product-Moment Correlations with the Criterion (r) for the Aptitudes of the GATB

N = 98

Aptitudes	M	σ	r
G-Intelligence	97.8	14.8	.522**
V-Verbal Aptitude	91.5	13.6	.424**
N-Numerical Aptitude	101.6	15.0	.512**
S-Spatial Aptitude	95.4	17.6	.304**
P-Form Perception	90.2	16.0	.358**
Q-Clerical Perception	85.0	13.6	.342**
A-Aiming	92.2	21.3	.285**
T-Motor Speed	87.5	21.2	.366**
F-Finger Dexterity	90.0	20.6	.222*
M-Manual Dexterity	99.9	20.3	.326**

**Significant at the .01 level
*Significant at the .05 level

Aptitudes N, M and G have the highest mean scores and aptitudes V, Q and G have relatively low standard deviations.

For a sample of 98 cases, correlations of .259 and .199 are significant at the .01 level and the .05 level of confidence, respectively. Aptitudes G, V, N, S, P, Q, A, T and M correlate significantly with the criterion at the .01 level. Aptitude F correlates significantly with the criterion at the .05 level.

C. Selection of Test Norms

TABLE IV

Summary of Qualitative and Quantitative Data

Type of Evidence	Aptitudes									
	G	V	N	S	P	Q	A	T	F	M
Job Analysis Data										
Important	X		X			X				
Irrelevant				X	X		X	X	X	X
Relatively High Mean	X		X							X
Relatively Low Sigma	X	X				X				
Significant Correlation with Criterion	X	X	X	X	X	X	X	X	X	X
Aptitudes to be considered for trial norms	G	V	N			Q				

Trial norms consisting of various combinations of three and four of Aptitudes G, V, N and Q with appropriate cutting scores were evaluated against the criterion by means of the tetrachoric correlation technique. A comparison of the results showed that B-1001 norms consisting of G-80, V-75, N-85, and Q-75 had the best selective efficiency.

VII. Validity of Norms

The validity of the norms was determined by computing a tetrachoric correlation coefficient between the test norms and the criterion and applying the Chi Square test. The criterion was dichotomized by placing as close as possible to one-third of the sample in the low criterion group. A criterion critical score of 30 was used and resulted in 31 of the workers, or 32 percent of the sample, being placed in the low criterion group.

Table V shows the relationship between test norms consisting of Aptitudes G, V, N and Q with critical scores of 80, 75, 85 and 75 respectively, and the dichotomized criterion for Weighing Station Operator 0-95.906. Workers in the high criterion group have been designated as "good workers" and those in the low criterion group as "poor workers."

TABLE V

Validity of Test Norms (G-80, V-75, N-85, Q-75)

Weighing Station Operator 0-95.906

N = 98

	Non-Qualifying Test Scores	Qualifying Test Scores	Total
Good Workers	12	55	67
Poor Workers	24	7	31
Total	36	62	98

$r_{tet} = .81$ $\quad X^2 = 29.785$

$\sigma_{r_{tet}} = .17$ $\quad P/2 < .0005$

The data in the above table indicate a significant relationship between the test norms and the criterion for the sample.

VIII. Conclusions

On the basis of the results of this study, Aptitudes G, V, N and Q with minimum scores of 80, 75, 85 and 75 respectively, have been established as B-1001 norms for the occupation of Weighing Station Operator 0-95.906. The equivalent B-1002 norms consist of G-75, V-75, N-80 and Q-80.

IX. Determination of Occupational Aptitude Pattern

A significant relationship between OAP-19 and the criterion for the experimental sample was obtained. The proportion of the sample screened out by OAP-19 was .38, which is within the required range of .10 to .60. Therefore, the occupation Weighing Station Operator 0-95.906 will be allocated to OAP-19.